

CLAIMS

1. Apparatus for treating highly corrosive agents, comprising a tube bundle (14) heat exchanger (10), structured to carry out a heat exchange between two fluids 5 one of which is highly corrosive and flowing inside of said tube bundle (14), characterized in that said tube bundle (14) comprises at least one titanium or titanium alloy tube (14a), coated with a layer (25) of zirconium or zirconium alloy.
- 10 2. Apparatus according to claim 1, characterized in that said at least one titanium or titanium alloy tube (14a) is coated on the inside by said zirconium or zirconium alloy layer (25).
- 15 3. Apparatus according to claim 1, characterized in that said at least one titanium or titanium alloy tube (14a) has a thickness between 1.0 and 10 mm, and in that said zirconium or zirconium alloy coating layer (25) has a thickness between 0.3 and 2.0 mm.
- 20 4. Apparatus according to claim 1, characterized in that said at least one titanium or titanium alloy tube (14a) is only partially coated with said zirconium or zirconium alloy layer (25).
5. Apparatus according to claim 4, characterized in that said zirconium or zirconium alloy layer (25) coats solely

an end portion (14b) of said heat exchange tube (14a).

6. Apparatus according to claim 3, characterized in that said zirconium or zirconium alloy layer (25) extends in said at least one titanium or titanium alloy tube (14a) 5 starting from an entry end (26) towards an opposite end (27) thereof, for a portion between 5 and 30%.

7. Apparatus according to claim 1, characterized in that said at least one titanium or titanium alloy tube (14a) and said zirconium or zirconium alloy coating layer (25) are 10 bonded together metallurgically or through welding.

8. Apparatus according to claim 7, characterized in that said at least one titanium or titanium alloy tube (14a) and said zirconium or zirconium alloy coating layer (25) are bonded together through hot-drawing.

15 9. Apparatus according to claim 1, characterized in that said heat exchanger (10) comprises respective upper and lower tube plates (15, 16) for supporting said tube bundle (14), said tube plates (15, 16) being made of titanium or titanium alloy, or being coated with a titanium or titanium 20 alloy layer.

10. Apparatus according to claim 9, characterized in that said upper and lower tube plates (15, 16) are made of carbon or stainless steel, coated on the outside with a layer of 3-15 mm of titanium or titanium alloy.

11. Stripper for the decomposition of ammonium carbamate in an urea production plant, characterized in that it comprises a tube bundle (14) heat exchanger (10) comprising at least one titanium or titanium alloy tube (14a), coated 5 with a zirconium or zirconium alloy layer (25).
12. Condenser for the condensation of ammonia and carbon dioxide into ammonium carbamate in an urea production plant, characterized in that it comprises a tube bundle (14) heat exchanger (10) comprising at least one titanium 10 or titanium alloy tube (14a), coated with a zirconium or zirconium alloy layer (25).